

<i>CW</i>	<i>2-18-87</i>
<i>sc</i>	<i>2-17-87</i>

BA/WTR
WR
MAIL STOP 60190

FEB 18 1987

MEMORANDUM

To: ARD-Refuges and Wildlife, Region 6 (60130)
Attn: Jim Matthews

From: ~~ACTING~~ Regional Hydrologist, Division of Water Resources,
Region 6

Subject: Annual Water Management Plans

Plans have been reviewed and found to be in order for the following stations:

Valentine NWR	Arapaho NWR
	Hutton Lake NWR
Fort Niobrara NWR	Bamforth NWR
Alamosa-Monte Vista NWR	Rainwater Basin WMD
Quivira NWR	<u>Lake Andes NWR</u>
	Broken Arrow WPA
Crescent Lake NWR	Karl Mundt NWR
Waubay NWR	
Overberg WPA	
Case WPA	
Meyer-Janssen WPA	
O'Farrell WPA	
Ringer WPA	
Hofland WPA	

Please extend our thanks to refuge personnel for the timely submission of these reports.

Cheryl Willis

bcc: WTR rdg fl
Circ fl
RD

WTR:CWillis:sc:2-17-87

Need to ^{ok}
advise when
water put
to beneficial
use under
permit at
Broken Arrow

1987 ANNUAL WATER MANAGEMENT PLAN
AND
1986 WATER CONDITIONS AND USAGE
E ANDES NATIONAL WILDLIFE REFUGE COMPLEX
LAKE ANDES, SD

WATER UNIT: Lake Andes

Lake Andes is a 4730 acre meandered lake whose water level depends entirely upon annual runoff. Two dikes cut the lake into three units, the North, Center, and South. Stop log water control structures are located within each dike, however, the lack of a permanent water supply precludes any water level manipulations.

Drainage area size and surface acres for each unit of Lake Andes are shown below. Maximum and average depth figures were determined in 1962, the last time the lake was completely full.

Unit	Drainage Area		Surface Acres of Water	Water Capacity (Acre Feet)	Depth/full	
	Acres				Max	Avg
South	20,000	24%	1,760	16,159	13.5	11.5
Center	11,000	14%	2,359	18,000	14.5	12.9
North	53,000	62%	611	3,015	10.5	9.1
TOTAL	84,000	100%	4,730	37,174	--	--

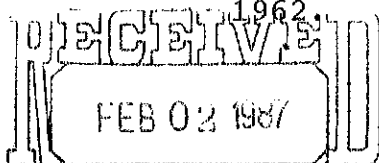
In 1922, Congress passed a bill establishing a high water elevation of 1437.25 feet msl for Lake Andes via the construction of an artificial outlet on the South Unit. This level was established following local complaints about flooding around the lake. The Fish and Wildlife Service received the right to flood the meandered lake bed of Lake Andes in an easement taken in 1939 from the State of South Dakota.

II. 1986 Water Conditions

Spring runoff from snowfall raised all units by 1 foot to 1435.25. During April and in May 9.4" of rain fell raising the level of the North Unit to 1438.15 and the Center and South Units to 1437.91. These were the highest elevations recorded since

1962.

Rec'd
Wildlife Res. JAN 26 1987



WATER RESOURCES

On June 11, heavy rainfall amounts of up to 6" fell over much of the Lake Andes watershed and caused lowland flooding. The South Unit filled faster than the other units and overflowed into the Center Unit through the South dike stoplog structure. Both the North and South dikes were overtoped by water. An elevation of 1441.10 was recorded on June 12 which is the highest recorded level since 1924. For the remainder of the summer and fall the lake continued to drain through the outlet structure until it reached the set high water mark in November.

1986 Lake Andes Water Levels -Feet MSL

DATE	NORTH UNIT	CENTER UNIT	SOUTH UNIT
03/21	1437.20	1435.45	1435.45
04/16	1437.00	1436.20	1436.20
04/21	1437.60	1436.95	1436.95
04/28	1438.15	1437.91	1437.91
06/12	1441.30	1441.10	1441.10
07/08	1440.75	1440.75	1440.75
08/01	1439.80	1439.80	1439.80
08/27	1438.62	1438.62	1438.62
09/19	1438.05	1438.05	1438.05
10/06	1438.72	1438.72	1438.72
11/06	1437.06	1437.06	1437.06
12/06	FREEZE UP		

III. Ecological Effects of Increased Water Levels In Lake Andes

The rapid increase in water levels in 1986 had far reaching impacts on Lake Andes wildlife and vegetation types.

Waterfowl breeding pairs totaled 501, down 32% from 798 counted in 1985. Diver pairs were almost non-existent. This was due to 95% of the cattail stands being drowned out since 1984. Lake Andes provided deep, open water habitat and without stands of emergent vegetation was not attractive to waterfowl nesting pairs. They preferred the excellent habitat now found off-refuge.

The production of submergent vegetation decreased because of the deep water. Use days by wigeon, gadwall, and blue-winged teal during migration were down from 1985.

Many of the cottonwoods lining the shoreline have been killed by the high water conditions. These trees have subsequently been loosened by the high water and blown over by high winds creating a tree-matted shoreline.

The significantly high water conditions will benefit the Lake Andes fisheries. However, populations of largemouth bass, yellow perch, and bluegills are on the decline because of the extremely high bullhead population. Virtually no recruitment of the game fish species is occurring because of predation by the bullheads. Chances of a fisheries winter kill have been reduced significantly.

IV. 1987 Water Management Objectives

Management objectives for 1987 are to contain as much runoff as possible in Lake Andes. Water will continue to be released from the outlet on the South Unit in excess of the 1437.25 elevation mandated by Congress.

WATER UNIT: Owens Bay

I. Introduction

The Owens Bay Unit is a 240 acre marsh unit, separated by a dike from the South Unit of Lake Andes. A stop-log water control structure is located in the dike to allow water releases into Lake Andes.

Owens Bay, in addition to water from natural runoff, is maintained by a free flowing artesian well. The well, drilled in 1957, originally had a 1000 gpm flow and water right. Well shutdowns during the 1973 DVE outbreak resulted in casing destruction and new casing had to be installed. The new casing reduced the well opening from 12" to 8" and dropped the flow to approximately 450 gpm.

In 1986, Ducks Unlimited funded the drilling of a new 12" artesian well and the old well was capped. The new well has a 800-1000 gpm flow. The well distribution box and pipeline supplying the Prairie Ponds were also replaced.

II. Objectives

Owens Bay water management objectives are to store annual runoff and artesian well water to be used primarily as waterfowl habitat. Waterfowl production is the primary objective on Owens Bay. The emphasis is on providing excellent breeding pair habitat and permanent brood water. Secondary objectives include providing waterfowl migrational habiatat and benefits for marsh and water birds, shorebirds, gulls, terns, and resident wildlife.

III. 1986 Water Conditions

A mild, open winter followed the extreme cold and heavy snowfall recorded during the last few months of 1985. Snowfall for the period January through March was only 10.1 inches. Spring runoff was below normal, but with the artesian well flow supplementing the runoff, Owens Bay filled to capacity. The months of April, May, and June were very wet with 16.06 inches of precipitation recorded. Total precipitation for 1986 was 32.07 inches which is 10.7 inches above normal.

1986 Water Levels - Owens Bay

DATE	WATER LEVEL
03/21	1441.77
04/28	1442.96
06/01	1442.57
06/12	1444.57
08/01	1441.47
09/08	1442.04
10/06	1442.72
10/27	1442.46
High Water Elevation	1442.12
Pool Bottom	1436.52

IV. Ecological Effects of the Past Years Levels on Owens Bay

High water conditions existed through much of 1986. The number of waterfowl pairs on Owens Bay in 1986 (137 pairs) was up slightly from 131 counted in 1985. Brood habitat was good with an excellent interspersian of open water in the cattail stands. Spring and fall use by migrant waterfowl was high.

V. 1987 Water Management Objectives

Water Management activities for 1987 are to contain as much runoff as possible in Owens Bay. The artesian well will continue to run at full flow in order to offset annual evaporation.

The Prairie Ponds that were drained in 1986 to facilitate the well replacement project will not be flooded until fall. Plans are to replace four concrete water control structures that have deteriorated.

WATER UNIT: Broken Arrow Waterfowl Production Area

I. Introduction

The Broken Arrow WPA is a 2650 acre tract in Douglas and Charles Mix Counties, SD. Two drainage systems existed on the property when purchased. The Mud Lake Drain has an upstream watershed of 25,600 acres, while the second system, the Joubert Drain, has a 12,320 acre watershed. Five ditch plugs or low head dams, with concrete stop-log control structures, were installed in 1979 along the drainage ditches, two on the Mud Lake ditch and the remaining three on the Joubert drain. Dam #6 was constructed below dam #2 on the Mud Lake drain in 1984. Dam #7 is new this year. Design specifications for the seven dams are as follows:

Embankment Volume YD ³	High Water Contour	Surface Acres	Acre-feet Impounded
Dam #1 - 76	Unk	6.2	5.7
Dam #2 - 755	Unk	27.9	82.6
Dam #3 - 2761	Unk	43.6	163.0
Dam #4 - 586	Unk	34.7	88.3
Dam #5 - 137	Unk	6.3	5.2
Dam #6 - 900	Unk	30.0	Not determined
Dam #7 - 5470	1526.0	<u>56.4</u>	<u>131.2</u>
TOTAL		205.1	476.0

A new impoundment on the Joubert Drain was constructed during the fall of 1986 in cooperation with Ducks Unlimited who funded the project design and construction. A water rights permit for the storage of 131.2 acre feet of water was granted by the South Dakota Department of Water and Natural Resources. The impoundment at capacity covers 56.4 surface acres. The development will increase the quantity of pair habitat by creating 5.9 miles of shoreline. The maximum depth will be 6.5 feet.

The capability to manipulate water levels is very limited on the Broken Arrow WPA. Impoundments can be drawn down as objectives dictate. However, to reflood depends on spring runoff and no capability to flood when desired is possible.

II. Objectives

The storage of annual runoff in impoundments to be used primarily as water habitat. The habitat provided also benefits marsh and water birds, shorebirds, gulls, terns, and raptorial birds. Secondary benefits are provided to resident wildlife and livestock used for management purposes. Water excess to storage needs is allowed to drain through the system.

III. 1986 Water Conditions

A mild, open winter followed the extreme cold and heavy snowfall recorded during the last few months of 1985. Snowfall for the period January through March was only 10.1 inches. Spring runoff was below normal and all impoundments remained below full pool capacity by April 1. The months of April, May, and June were very wet with 16.06 inches of precipitation recorded. All pools filled to capacity. Both drains had very little flow by late summer and water levels were reduced by evaporation. Total precipitation for 1986 was 32.07 inches which is 10.7 inches above normal.

IV. Ecological Effects of the Past Years Water Levels on the Broken Arrow WPA

High impoundment levels resulted in good waterfowl habitat. All impoundments had an excellent covering of smartweed. A few cattails are becoming colonized in impoundment #2. Because of the lack of suitable emergent vegetation, no nesting sites for over-water nesters such as diving ducks are provided.

Carp have become established in all impoundments. Water quality has diminished which has lowered productivity. The refuge staff test netted impoundments #2, #3, and #4 in October to see what fish populations existed even though no stocking had ever been done. A large population of carp and bullheads were found along with a few largemouth bass, northern pike and green sunfish.

V. 1987 Management Objectives

Water management objectives for 1987 are to contain the spring runoff to maximum designed elevations behind the six existing dams. A fall draw down on October 15 will be implemented on dams #3 and #4 to winter kill the high carp population.

The water levels in the new impoundment (dam #7) will be maintained two feet below the full supply level during the first year post-construction. This will lessen erosion until permanent vegetation becomes established.

WATER UNIT: Karl E. Mundt National Wildlife Refuge

The Karl E. Mundt NWR borders the Missouri River in Gregory County. The refuge was established in 1974 to protect habitat important to wintering bald eagles. The only water on the unit itself are four small (less than 1 acre) stock ponds that are used in conjunction with the grazing program. There is also a free-flowing artesian well that provides domestic water for the refuge quarters. Some of the flow from the well is diverted from the house to a small 1/2 acre pond to reduce water pressure going to the house.

There presently is no active management of water on the Karl E. Mundt Refuge.